

Appendix D

PATHWAY EVALUATION WORKSHEET

If this worksheet is being used in lieu of the Tier 1 software to perform the pathway evaluations, it must be completed and attached to the Tier 1 report which is submitted to the department. For each pathway, follow the sequence of questions to determine whether the pathway passes (clears) the Tier 1 evaluation. Begin by answering the first general question. Circle your response to each applicable question (Y for "yes" or N for "no"). Your response will dictate which question should be answered next. Upon completion of the questions, complete the Pathway Evaluation Summary (page 3 of the Tier 1 Report).

General.

1. While drilling, has bedrock been encountered before encountering groundwater?
Y -- Cease Tier 1 pathway evaluations. A Tier 2 Site Cleanup Report must be completed and all pathways must be evaluated in accordance with special bedrock procedures in Subrule 135.10(3) and the Tier 2 guidance document.
N -- Go to 2.
2. Has free product been encountered?
Y -- Cease Tier 1 pathway evaluations. A Tier 2 Site Cleanup Report must be completed and all the pathways must be evaluated in accordance with the Tier 2 guidance document. Note, however, the sampling and receptor survey required for the Tier 1 assessment are also required for the Tier 2 assessment, in addition to the Tier 2 sampling requirements.
N -- Go to the pathway-specific evaluation questions.

Groundwater Ingestion Pathway:

1. Has groundwater been encountered (subject to drilling depth requirements)?
Y -- Go to 2.
N -- No further action required for this pathway.
2. Do the maximum measured concentrations of BTEX or TEH in groundwater exceed the Tier 1 levels for actual receptors?
Y -- Go to 3.
N -- Passed Tier 1 for actual receptors (also passed Tier 1 for potential receptors by default). No further action required for this pathway.
3. Are there any drinking water wells within 1,000 feet of the source?
Y -- Pathway complete for actual receptors. Failed Tier 1 for actual receptors. Go to 9.
N -- Pathway incomplete for actual receptors. Go to 4.
4. Do the maximum measured concentrations of BTEX or TEH in groundwater exceed the Tier 1 levels for potential receptors?
Y -- Go to 6.
N -- Go to 5.
5. Is the first encountered groundwater a protected groundwater source?
Y -- Pathway complete for potential receptors. No further action clearance for this pathway can be obtained with documentation to the UST Section that notification has been provided to the DNR Water Supply Section, or the county which has delegated authority for issuing public water supply construction permits or regulating private water well construction.
N -- Passed Tier 1. No further action required for this pathway.

Appendix D - Groundwater Ingestion Pathway (continued):

6. Are there any non-drinking water wells within 1,000 feet of the source?
Y -- Pathway complete for potential receptors. Failed Tier 1 for potential receptors. Go to 8.
N -- Go to 7.
7. Is the first encountered groundwater a protected groundwater source?
Y -- Pathway complete for potential receptors. Failed Tier 1 for potential receptors. Corrective action is required which addresses the protected groundwater source receptor (see options below).
N -- Pathway is incomplete for actual and potential receptors. No further action required for this pathway.
8. Is the first encountered groundwater a protected groundwater source?
Y -- Corrective actions are required which address non-drinking water well receptors and the protected groundwater source receptor (see options below).
N -- Corrective action is required which addresses non-drinking water well receptors (see options below).
9. Do the maximum measured concentrations of BTEX or TEH in groundwater exceed the Tier 1 levels for potential receptors?
Y -- Go to 11.
N -- Go to 10.
10. Is the first encountered groundwater a protected groundwater source?
Y -- Pathway complete for potential receptors. Corrective action is required which addresses drinking water well receptors (see options below) and notification must be provided to the DNR Water Supply Section, or the county which has delegated authority for issuing public water supply construction permits or regulating private water well construction.
N -- Corrective action is required which addresses drinking water well receptors (see options below).
11. Are there any non-drinking water wells within 1,000 feet of the source?
Y -- Pathway complete for potential receptors. Failed Tier 1 for potential receptors. Go to 13.
N -- Go to 12.
12. Is the first encountered groundwater a protected groundwater source?
Y -- Pathway complete for potential receptors. Failed Tier 1 for potential receptors. Corrective actions are required which address drinking water well receptors and the protected groundwater source (see options below).
N -- Corrective action is required for drinking water well receptors.
13. Is the first encountered groundwater a protected groundwater source?
Y -- Corrective actions are required which address drinking water well receptors, non-drinking water well receptors, and the protected groundwater source receptor (see options below).
N -- Corrective actions are required which address drinking water well receptors and non-drinking water well receptors (see options below).

Corrective Action Response Options:

No further action clearance for this pathway may be obtained if the appropriate institutional control for each affected receptor has been implemented or established. Documentation of the following institutional control activities must be provided in order to receive clearance for this pathway.

- **drinking water well receptors** - all drinking water wells within 1,000 feet of the source must be properly plugged.
- **non-drinking water well receptors** - all non-drinking water wells within 1,000 feet of the source must be properly plugged.
- **protected groundwater source receptors** - if the Tier 1 levels for actual receptors are exceeded, notification must be provided to the DNR Water Supply Section, or the county which has delegated authority for issuing public water supply construction permits or regulating private water well construction; and if the Tier 1 levels for potential receptors are exceeded, an institutional control which prohibits the use of the protected groundwater source within 1,000 feet of the source must be established.

If an institutional control cannot be implemented for any of the affected receptors, a T2 SCR must be completed.

Appendix D - Soil Leaching to Groundwater Pathway:

1. Do the maximum measured concentrations of benzene, toluene, ethylbenzene, or TEH in soil exceed the Tier 1 levels?
Y -- Go to 2.
N -- Passed Tier 1. No further action required for this pathway.
2. Has groundwater been encountered (subject to drilling depth requirements)?
Y -- Go to 3.
N -- Go to 4.
3. Are there any drinking water wells or non-drinking water wells within 1,000 feet of the source or is the first encountered groundwater a protected groundwater source?
Y -- Pathway complete. Failed Tier 1. Corrective actions are required to address existing drinking water well receptors, non-drinking water well receptors, and/ or the protected groundwater source receptor. Go to 5.
N -- Pathway incomplete. Passed Tier 1. No further action required for this pathway.
4. Are there any drinking water wells or non-drinking water wells within 1,000 feet of the source?
Y -- Pathway complete. Failed Tier 1. Go to 6.
N -- Passed Tier 1. No further action required for this pathway.
5. Will an institutional control which prohibits the use of groundwater within 1,000 feet of the source be established?
Y -- Provide documentation to the department that institutional controls have been established (i.e., existing drinking water wells and non-drinking water wells must be properly plugged and well installation within 1,000 feet must be prohibited).
N -- Go to 7.
6. Will all drinking water wells and non-drinking water wells within 1,000 feet of the source be properly plugged?
Y -- Provide documentation to the department that existing drinking water wells and non-drinking water wells have been properly plugged.
N -- Go to 7.
7. Will soil which exceeds the Tier 1 levels be excavated in accordance with the "Tier 1 Corrective Action Response" section of the Tier 1 guidance document?
Y -- Provide documentation to the department that contaminated soil has been excavated and sampling has been conducted to demonstrate the remaining soil contamination is below the Tier 1 levels for this pathway.
N -- Complete a Tier 2 SCR.

Groundwater Vapor to Enclosed Space Pathway:

1. Have explosive vapor levels (> 10% LEL) been identified in any enclosed spaces within 500 feet of the source?
Y -- Failed Tier 1. The condition must be handled under IDNR's emergency response protocols. Complete a Tier 2 SCR for this pathway.
N -- Go to 2.
2. Has groundwater been encountered (subject to drilling depth requirements)?
Y -- Go to 3.
N -- Passed Tier 1. No further action required for this pathway.
3. Do the maximum measured concentrations of benzene, toluene, ethylbenzene, or TEH in groundwater exceed the Tier 1 levels?
Y -- Failed Tier 1. Corrective action is required for this pathway. Go to 4.
N -- Passed Tier 1. No further action required for this pathway.

Appendix D - Groundwater Vapor to Enclosed Space Pathway:

4. Will an institutional control which prohibits subsurface enclosed space receptors within 500 feet of the source be established?
Y -- Provide documentation to the department that institutional controls which prohibit and eliminate buildings with basements, sewer lines, and subsurface utility vaults within 500 feet of the source have been implemented.
N -- Complete a Tier 2 SCR.

Soil Vapor to Enclosed Space Pathway:

1. Have explosive vapor levels (> 10% LEL) been identified in any enclosed spaces within 500 feet of the source?
Y -- Failed Tier 1. The condition must be handled under IDNR's emergency response protocols.
Complete a Tier 2 SCR for this pathway.
N -- Go to 2.
2. Do the maximum measured concentrations of benzene, toluene, ethylbenzene, or TEH in soil exceed the Tier 1 levels?
Y -- Go to 5.
N -- Go to 3.
3. Have soil gas measurements been taken?
Y -- Go to 4.
N -- Passed Tier 1. No further action required for this pathway.
4. Do either the initial soil gas measurements or the confirmation gas measurements exceed the soil gas target levels?
Y -- Failed Tier 1. Corrective action required for this pathway. Go to 8.
N -- Passed Tier 1. No further action required for this pathway.
5. Have soil gas measurements been taken?
Y -- Go to 6.
N -- Failed Tier 1. Corrective action required for this pathway. Go to 7.
6. Do either the initial soil gas measurements or the confirmation gas measurements exceed the soil gas target levels?
Y -- Failed Tier 1. Corrective action required for this pathway. Go to 9.
N -- Passed Tier 1. No further action required for this pathway.
7. Will soil which exceeds the Tier 1 levels be excavated?
Y -- Provide documentation to the department that contaminated soil has been excavated and sampling has been conducted to demonstrate the remaining soil contamination is below the Tier 1 levels for this pathway.
N -- Go to 8.
8. Will an institutional control which prohibits enclosed space receptors within 500 feet of the source be established?
Y -- Provide documentation to the department that institutional controls which prohibit and eliminate buildings with basements, sewer lines, and subsurface utility vaults within 500 feet of the source have been implemented.
N -- Complete a Tier 2 SCR.
9. Will an institutional control which prohibits enclosed space receptors within 500 feet of the source be established?
Y -- Provide documentation to the department that institutional controls which prohibit and eliminate buildings with basements, sewer lines, and subsurface utility vaults within 500 feet of the source have been implemented.
N -- Go to 10.

Appendix D - Soil Vapor to Enclosed Space Pathway (continued):

10. Will soil which exceeds the Tier 1 levels be excavated?

Y -- Go to 11.

N -- Complete a Tier 2 SCR.

11. Do soil gas measurements taken after completion of the excavation exceed the soil gas target levels?

Y -- Complete a Tier 2 SCR.

N -- Provide documentation to the department that contaminated soil has been excavated and soil sampling and soil gas sampling have been conducted to demonstrate the remaining soil contamination and soil gas levels are below the Tier 1 levels for this pathway.

Groundwater to Plastic Water Line Pathway:

1. Has groundwater been encountered (subject to drilling depth requirements)?

Y -- Go to 2.

N -- Pathway is incomplete. Passed Tier 1. No further action required for this pathway.

2. Is the first encountered groundwater less than 20 feet from the ground surface?

Y -- Go to 3.

N -- Pathway incomplete. Passed Tier 1. No further action required for this pathway.

3. Do the maximum measured concentrations of BTEX or TEH in groundwater exceed the Tier 1 levels?

Y -- Go to 4.

N -- Passed Tier 1. No further action required for this pathway.

4. Are there any existing plastic water lines within 200 feet of the source?

Y -- Pathway complete for actual receptors. Failed Tier 1. Corrective action required for this pathway. Go to 5.

N -- Pathway complete for potential receptors. Failed Tier 1. No further action clearance for this pathway can be obtained with documentation to the UST Section that notification of the conditions at the site has been provided to the utility company which supplies water service to the area.

5. Will all plastic water lines within 200 feet of the source be replaced or relocated?

Y -- Provide documentation to the department that plastic water lines within 200 feet of the source have been replaced with non-plastic water lines or they have been relocated to a distance of greater than 200 feet of the source, **and** that notification of the conditions at the site has been provided to the utility company which supplies water service to the area.

N -- Complete a Tier 2 SCR.

Soil to Plastic Water Line Pathway:

1. Do the maximum measured concentrations of benzene, toluene, ethylbenzene, or TEH in soil exceed the Tier 1 levels?

Y -- Go to 2.

N -- Passed Tier 1. No further action required for this pathway.

2. Are there any plastic water lines within 200 feet of the source?

Y -- Pathway complete for actual receptors. Failed Tier 1. Corrective action required for actual receptors. Go to 3.

N -- Pathway complete for potential receptors. Failed Tier 1. No further action clearance for this pathway can be obtained with documentation to the UST Section that notification of the conditions at the site has been provided to the utility company which supplies water service to the area.

Appendix D - Soil to Plastic Water Line Pathway (continued):

3. Will all plastic water lines within 200 feet of the source be replaced or relocated?
Y -- Provide documentation to the department that plastic water lines within 200 feet of the source have been replaced with non-plastic water lines or they have been relocated to a distance of greater than 200 feet of the source, **and** that notification of the conditions at the site has been provided to the utility company which supplies water service to the area.
N -- Go to 4.
4. Will soil which exceeds the Tier 1 levels be excavated?
Y -- Provide documentation to the department that contaminated soil has been excavated and sampling has been conducted to demonstrate the remaining soil contamination is below the Tier 1 levels for this pathway.
N -- Complete a Tier 2 SCR.

Surface Water Pathway:

1. Are there any surface water bodies within 200 feet of the source?
Y -- Pathway complete. Go to 2.
N -- Pathway incomplete. Passed Tier 1. No further action required for this pathway.
2. Is there a petroleum sheen on the surface water body or petroleum residue along the bank of an intermittent stream bed?
Y -- Go to 3.
N -- Go to 5.
3. Is the sheen or residue a petroleum-regulated substance?
Y -- Go to 4.
N -- Provide analytical data to verify. Go to 5.
4. Is the sheen or residue attributable to the subject site?
Y -- Failed Tier 1. Contact the department. Complete a Tier 2 SCR.
N -- Go to 5.
5. Has groundwater been encountered (subject to drilling depth requirements)?
Y -- Go to 6.
N -- Passed Tier 1. No further action required for this pathway.
6. Are there any designated-use segments (as provided in Chapter 567-61.3(1) and 61.3(5) of the IAC) within 200 feet of the source?
Y -- Go to 7.
N -- Passed Tier 1. No further action required for this pathway.
7. Do the maximum measured concentrations of BTEX or TEH in groundwater exceed the Tier 1 levels?
Y -- Failed Tier 1. Complete a Tier 2 SCR.
N -- Passed Tier 1. No further action required for this pathway.